

CHINA A FRUITFUL FIELD FOR PLANT EXPLORATION.

(Plates XXIX to XXXVI.)

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HAD a race like the Chinese been living on the North American continent for forty centuries it is very likely that they would have evolved out of our native wild species of fruits varieties of great merit. Since the continent has not been occupied by an indigenous race of people which took pains to develop such native species as our American plums, hawthorns, persimmons, hickories, and numerous others, many of our plants have been neglected.

The Caucasian races appeared late on American soil and they had already developed so many types of their own which they brought with them that they naturally did not pay much attention to the strictly native American plants. However, many plants which came from western and southern Europe were not entirely successful on American soil, some even proving to be almost complete failures, such as certain European varieties of gooseberries, currants, raspberries, and strawberries. When the immigrants settled the western portion of the country it became especially apparent that many of these European cultivated varieties of fruits and vegetables were unsuited to the climatic and soil conditions prevailing there. This was because the climate of Europe was much more equable, more like the northern Pacific coast region than that of the Middle West. When we turn to other countries, particularly toward Asia, we find that in China, especially, climatic and soil conditions are in the main very similar to those in the United States; in fact, China's wild vegetation in some parts resembles that of the eastern United States to such an extent that a person suddenly transported from either region to the other would not always exactly realize where he was.

Fortunately, China has been settled for some forty centuries or longer and her industrious peoples have developed

from their native vegetation many improved varieties and types which are admirably suited to their local conditions. The climatic conditions in many parts of China being similar to those in certain parts of the United States, we need not hesitate about predicting the success of certain Chinese plant industries when they have been transplanted to this country, aside, of course, from certain economic conditions which are entirely different in China from what they are in North America.

Certain plants from China, indeed, have already become established in this country. Is it not a fact that the peach industry of Georgia has been built up on a variety which has a Chinese hybrid origin? Do not the Kieffer, LeConte, and Garber pears owe their success to their Chinese ancestry? Have not some Chinese trees like the *Ginkgo biloba*, the tree of heaven (*Ailanthus cacodendron*), the pride of India (*Melia azedarach*), and the camphor tree (*Cinnamomum camphora*) proved eminently successful in many parts of the United States? Are not our porches adorned by *Wistaria chinensis*, our hybrid roses being hybridized with the Wichuriana rose, and our parks embellished with countless Chinese flowering shrubs, like tree peonies, abelias, golden bells, and mock oranges?

The Department of Agriculture, having long been in possession of facts regarding the existence of important and promising plant industries in China, decided to have a thorough investigation made as to the possibility of successfully introducing these industries into this country. It was my good fortune to have been selected to do this work. I have made three successive trips into China and in all spent about 6 years in that immense country, covering mainly, however, northern and eastern China and the neighboring regions of northern Chosen (Korea), eastern as well as western and central Siberia and Mongolia, and Russian Turkestan. I did not visit southern China nor the upper Yangtse Valley regions. Six years may seem to be a long time, but in a country so vast as China and where the means of communication are so primitive that on the average one can travel only 20 miles a day, after all one can not cover very much territory in that time. (See fig. 4.)

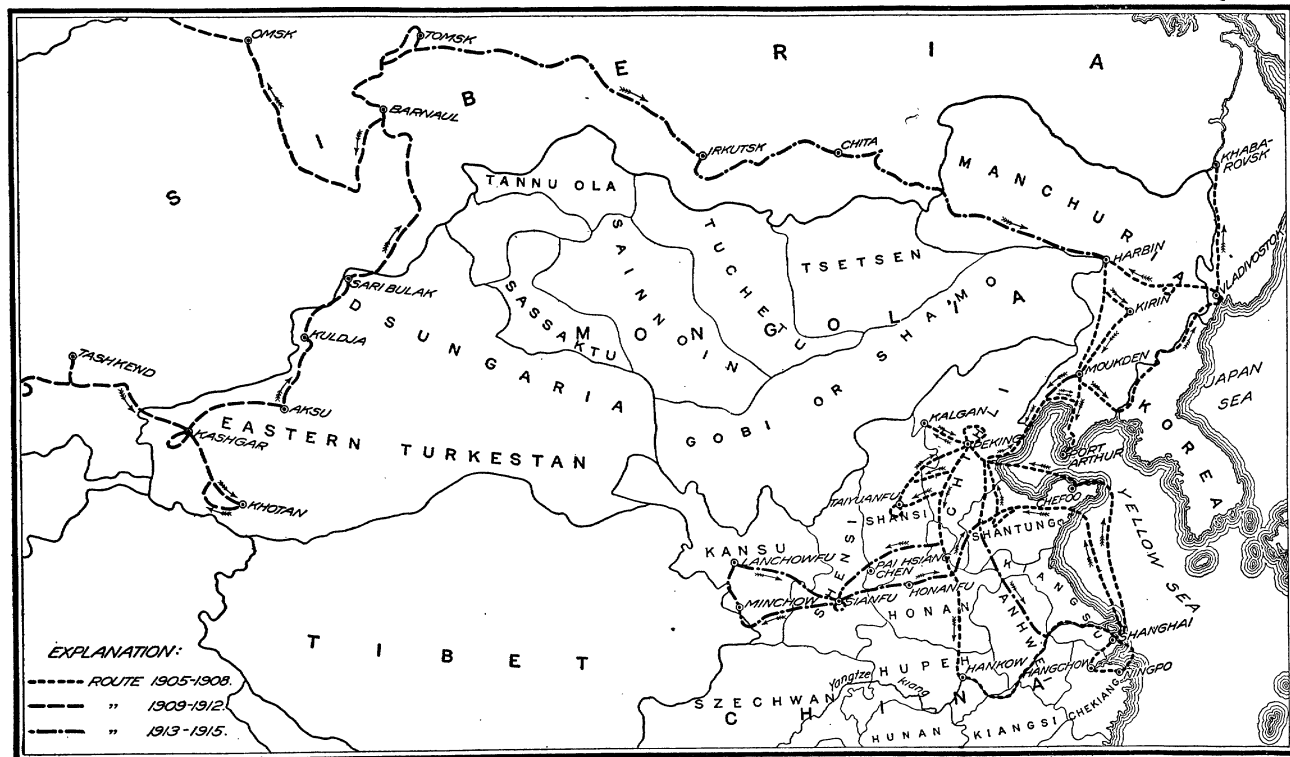


FIG. 4.—Map showing the routes through China and adjoining countries traveled by F. N. Meyer in his three trips as an agricultural explorer from 1905 to 1915.

The work of an agricultural explorer while in the field is strenuous in many ways. He must have a capable interpreter for this work, on account of the difficulties of the language. Without one it would be impossible at times to obtain the plants he is after. The absence of a good interpreter may mean the failure of a whole expedition, as in many parts of China the Chinese refuse to deal with a person who does not understand their ways of doing things.

In China there are 22 different languages and 400 dialects, and this causes endless trouble in traveling from one end of the country to the other. If a person follows the beaten path of travel from one big city to another, he will not experience the difficulties which an explorer encounters, for the latter to obtain the things he is after has necessarily to go into the out-of-the-way rural communities; for instance, one never finds the best groves of fruit trees along the highways of travel.

It is often only through a capable and energetic interpreter that one learns of the whereabouts of a valuable new plant variety. Having finished a day's cart journey and having settled in a Chinese inn, one's interpreter often begins to talk with fellow travelers and local residents about the business in which his master is engaged. The Chinese are very inquisitive. They find out every detail about one another's masters and their particular business. Often these travelers can not conceal their amazement when they learn that a foreigner has come so far to get a product which seems to them so common and with which they are so well acquainted. It frequently happens that such fellow travelers unconsciously give information of great value, and it is here that the capabilities of an interpreter come in. If he allows the conversation to drift into mere trivialities and does not make any mental or written notes, often the whole result of a conversation which lasts for hours is lost to the explorer.

The equipment of an agricultural explorer traveling in the interior of China is similar to the camping outfit used by any explorer going through a rough and unsettled country, although, of course, China in the main is densely settled. Nevertheless the accommodations at the inns are extremely poor. The work of an agricultural explorer is so far



P5936FS

FIG. 1.—THE EXPLORER'S CARAVAN OF PACK ANIMALS IN A MOUNTAIN DEFILE, COMING BACK FROM AN INVESTIGATION TRIP INTO A FRUIT DISTRICT NORTH-WEST OF PEKING, NEAR YING TAU KO, CHIH LI PROVINCE, CHINA.

Photographed September 13, 1913.



P10000F

FIG. 2.—THE EXPLORER'S CARAVAN, CONSISTING OF TWO SPRINGLESS CARTS WITH AWNINGS OF WOVEN KAOLIANG MATTING (*HOLCUS SORGHUM*), TRAVELING ALONG A DUSTY ROAD, NEAR TUNG CHEN, SHANSI, CHINA.

Photographed August 6, 1914.



P13104F8

ONE OF THE LARGE-FRUITED CULTIVATED VARIETIES OF JUJUBE (*ZIPHUS JUJUBA*), NATURAL SIZE, CALLED "TA YUAN TSAO," MEANING "LARGE ROUND JUJUBE."

A very promising variety propagated in China by suckers. Several cultivated varieties with fruits of this size or even larger have been introduced and fruited in America. Photographed at Pai Hsiang Chen, Shansi, China, August 10, 1914.



P13124F8

WILD JUJUBES (*ZIZIPHUS JUJUBA*) SHOWING THE NATURAL SIZE OF THE RIPE FRUITS BORNE BY THE SEEDLING TREES BROUGHT INTO AMERICA MANY YEARS AGO.

Photographed at Lau Yu Ko, Shensi, China, September 5, 1914.

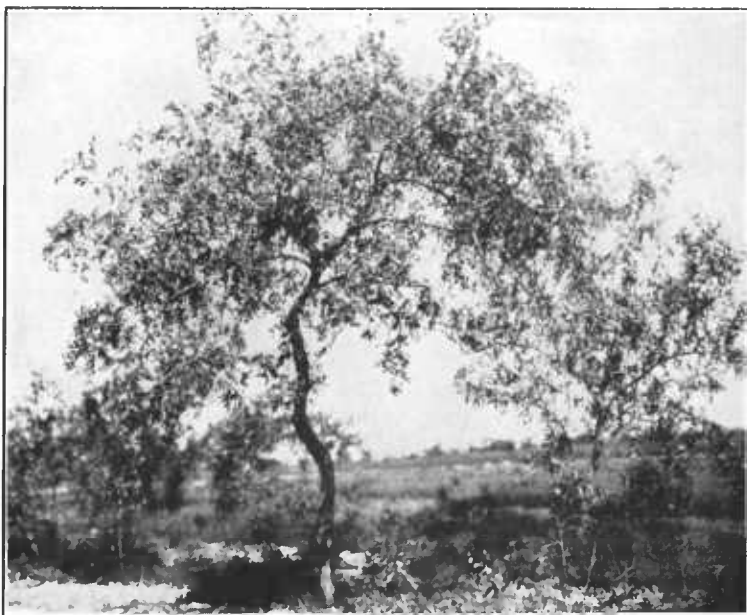


FIG. 1.—A SINGLE SPECIMEN TREE OF A CULTIVATED JUJUBE (*ZIZIPHUS JUJUBA*) CALLED "CHANG TSAO," MEANING "LONG JUJUBE."

Note the peculiar semidrooping habit, which is characteristic of most jujubes. Photographed at Paf Hsiang Chen, Shansi, China, August 10, 1914.



FIG. 2.—A GIGANTIC CAKE OF PROSO (*PANICUM MILIACEUM*) AND JUJUBES (*ZIZIPHUS JUJUBA*) BOILED TOGETHER AND SOLD IN SLICES FOR 2 TO 3 CENTS, MEXICAN, A SLICE.

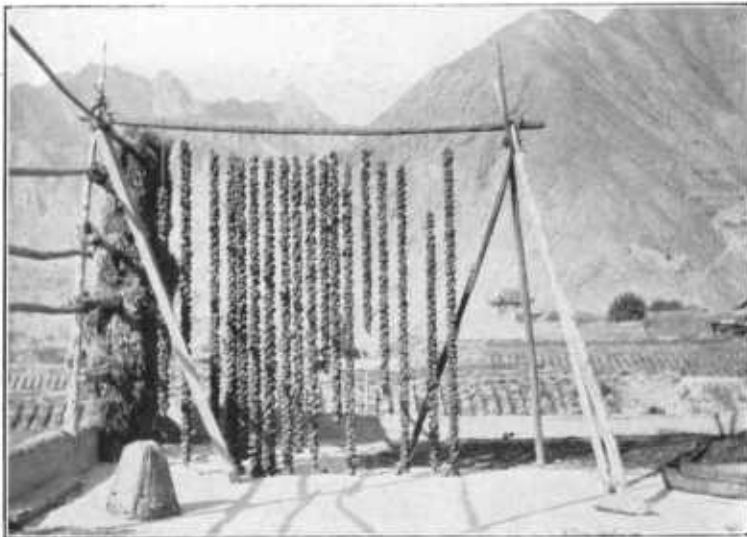
Photographed at Peking, China, April 27, 1915.



P191217B

FIG. 1.—OLD PERSIMMON TREES (*DIOSPYROS KAKI*) OVER 80 FEET IN HEIGHT. OUR CARAVAN RESTING AT THE BASE OF THE TREES, NEAR KWEI HSIEN, SHENSI, CHINA.

The trees are so tall that it is necessary to pick the fruit by means of a long bamboo pole with a bag fastened at the end. Photographed September 10, 1914.



P12236FS

FIG. 2.—LONG STRINGS OF PEELED PERSIMMONS HANGING FROM A POLE SET UP ON THE MUD ROOF OF A HOUSE IN SIKU, KANSU, AT THE TIBETAN BORDER OF CHINA.

Photographed November 16, 1914.



A GROVE OF PERSIMMONS (*DIOSPYROS KAKI*) CONSISTING MAINLY OF DRY-MEATED VARIETIES, ALL GRAFTED ON THE WILD PERSIMMON (*DIOSPYROS LOTUS*).

At the foot of the Tsing Ling Range near Sianfu, Shensi, China. Photographed January 22, 1914.



P5510F8

FIG. 1.—A LARGE STACK OF DRIED PERSIMMONS (*DIOSPYROS KAKI*) IN A FRUIT STOREROOM IN PEKING, CHINA.

The fruits are strung on twisted strings of dried rush stems, and in this way the product is marketed ready for human consumption. Photographed March 22, 1913.



P5540F8

FIG. 2.—AN OLD CHINESE CHESTNUT TREE (*CASTANEA MOLLISSIMA*) WITH BARK SCRAPED CLEAN BY THE NATIVES, RECOVERING FROM ATTACKS OF THE BLIGHT (*ENDOTHIA PARASITICA*).

Notice how the wounds are in the process of healing over. Photographed near San Tun Ying, Chihli Province, China, June 1, 1913.



P13206F8

FIG. 1.—A FINE GROVE OF A SLENDER TIMBER BAMBOO (*PHYLLOSTACHYS* SP.) OF VERY UNIFORM GROWTH, MUCH EMPLOYED IN THE MANUFACTURE OF FINE FURNITURE.

Native name "Tae tsoh." Photographed at Mokanshan, Chekiang Province, China, August 7, 1915.



P13201F8

FIG. 2.—A HILLSIDE GROVE OF THE IMPORTANT TIMBER BAMBOO (*PHYLLOSTACHYS PUBESCENS*) GROWING ON A THIN LAYER OF CLAY LOAM COVERING A STRATUM OF GRANITE ROCK WHICH IS BEING QUARRIED.

Native name "Mao tsoh." This species supplies edible sprouts as well as timber. Photographed at Mokanshan, Chekiang Province, China, August 3, 1915.

different from that of an ordinary botanical collector that he has to gather live material which is often extremely perishable, and has to be equipped with such paraphernalia as to enable him to send the live material on a long journey to his home country. It is necessary to carry a bale of sphagnum moss, rolls of oiled paper and packing paper, copper labels, notebooks, and herbarium driers in waterproof sacks, and supplies of twine and cloth from which seed bags can be made and in which the parcels of plant material can be sewed.

In sending plant material from the interior of China one has to know how and when to ship it. Seeds like grains and beans are the easiest of all, for when dry they can be packed in cloth bags, labels inclosed, and sent at almost any time of the year. Seeds of a perishable nature, however, like acorns and chestnuts, are much more difficult to ship. These have to be packed in moistened, powdered, washed-out charcoal, or in finely chopped-up dampened sphagnum moss inclosed in oiled paper and put into wooden boxes, so as to prevent the young sprouts from being crushed en route, for often these seeds start to grow in transit. Such seeds have to be sent as quickly as possible after collecting, for many of them perish within a few weeks. Scions and cuttings are even more difficult to handle, for they can be collected only in the resting season, which often is in winter, and have to be put in damp sphagnum moss within a few hours after being cut. I always made it a practice to pack such scions and cuttings the day I collected them and never let them remain unpacked a single night. In severe winter weather we often had to heat water to prevent it from freezing, in order to moisten the sphagnum moss, and sometimes a few minutes after the cuttings were wrapped the parcel was frozen hard, for in the rooms of a North China inn there are no stoves, the paper windows are often broken and torn, and the temperature inside is but little higher than that outside. I kept these frozen packages sometimes for several weeks, until I reached a post office which was willing to receive and forward them either direct to Washington or to the consul general in Shanghai.

I attribute the success which I have had in sending the parcels of living plant material from such far-away towns

as Kashgar, in Chinese Turkestan, and Lanchowfu, in Kansu, to Washington, D. C., to these special methods of packing which I have described. It must be admitted, however, that if the parcel post system had not been extended to these inland towns, and if our ambassador in St. Petersburg, the American minister in Peking, and the American consul general in Shanghai had not forwarded these official parcels of plants in their diplomatic and consular pouches through the State Department to the Department of Agriculture, these successes would have been minimized.

Owing to the fact that transportation in China is still quite as primitive as it was in America before the building of railroads, one has to travel there with a caravan composed of pack animals or Chinese springless carts. I found that when traveling with pack animals or with carts, except in the great heat of summer, it was better to walk, because I was then free to examine the roadside plants and trees without stopping the caravan. Often I found I could walk much faster than the caravan. When, however, I traveled through unsafe regions it was necessary to keep close to my men. In all the six years of travel in the interior of China, during which I walked several thousand miles, it has been my good fortune never to have had any accident of consequence, nor have I lost any large collections of material.

The collections of these years of travel comprised about 2,500 introductions, including seeds, bulbs, cuttings, scions, roots, and live plants, most of which were personally selected and generally for some specific purpose, the details of which will be found in the descriptions which were written in the field and appear in the printed inventories of the Office of Foreign Seed and Plant Introduction. A large number of photographs were taken and extensive collections of herbarium material were made.

In a paper of this nature, limited necessarily as to space, one can only pick out a few of the more interesting plants and plant industries. As this work has been going on since the fall of 1905, some of these eastern introductions have become successfully established in the United States and are proving to be valuable additions to American agriculture. Others of later introduction have been here too short a time

to enable us to say whether they will be of value. They are strictly in the experimental stage.

PROMISING NEW CROPS.

One of the most promising tree crops of China is the Chinese jujube (*Ziziphus sativa*). The most common form of this plant is found in waste places and on old walls in several parts of North China. It is a very spiny shrub or small tree bearing small, round fruits of a brown-red color, which are in general sour and have practically no value. The Chinese farmers, however, have selected numerous varieties of this jujube which vary in all possible ways. There are probably 300 or 400 named varieties in China, and while the fruit of the wild type is no larger than a small marble, some of the selected varieties are as large as a good-sized hen's egg. Some types are spherical and of very dark brown color, others being very elongated and light mahogany brown. Others again are very solid meated and can be kept for several weeks in a fresh state before spoiling. Some sorts again are of a very spongy texture and have to be eaten a few days after they have ripened, while others can not be dried, but must be eaten fresh, and still others can be easily dried and kept through the greater part of the year. A few varieties are smoked like hams or herrings and are exported from the Shantung Province to South China, where they form an especially prized sweetmeat with the people of that section. Others are put up in weak brandy and served during the New Year's holidays. One of the largest varieties when processed in a special way with cane sugar and honey makes a delicious sweetmeat comparable to a good quality of the Persian date. The high-class mandarins give them as New Year's presents, and they are served in the best hotels patronized by Europeans, on the passenger steamers plying between Japan and China, and at dinner parties in the various legations in Peking.

The jujube tree in China is one of the few trees which are not so regularly cultivated as the peach or the pear. It stands much more neglect than any other of the Chinese fruits and grows on soil which sometimes is quite alkaline in character and seems to thrive in dooryards in which the soil is packed down until almost as hard as a brick. It

responds, however, to cultivation, and in the district around Pai Hsiang Chen, Shansi, where the largest varieties in all China occur, the orchards of jujube are well cultivated. In the Provinces where it is found in its greatest perfection, such as Shantung, Shansi, Honan, and Shensi, winter temperatures never drop very low. Zero weather there is a rare occurrence. In America, however, some of the trees which were introduced in 1906 have withstood a temperature of -22° F. without injury. In general the jujube may be said to be a heavy bearer, and in Texas and California some varieties have proved unusually fruitful. They bear very early. some one-year-old grafts producing as many as 24 fruits.

The jujube will probably prove of the greatest value for the semiarid South and Southwest, especially for Texas, New Mexico, Arizona, California, southern Utah, and possibly it might extend into Kansas and Nebraska. The material so far has been too limited to enable us to distribute small trees of the jujube to the latter States. Trees have fruited heavily at Chico, Fresno, Indio, and Bard, Cal., and San Antonio, Austin, and Fort Worth, Tex.

In the late thirties of the last century jujube seeds were distributed by the Patent Office, and from these seeds large-sized trees have grown and are still standing at various points in the Southern Atlantic States. All of these, being seedlings, bear small, comparatively worthless fruit.

ORIENTAL PERSIMMONS SUITED FOR DRYING PURPOSES.

In certain sections of the provinces of Shantung, Shansi, Honan, Shensi, and Kansu one finds that strains of persimmons are being grown for drying purposes only. These regions are decidedly semiarid ones, where the autumn is long and the days are quite warm, similar in this respect to the climate of portions of Texas, New Mexico, Arizona, and California. These strains are quite different—not as juicy as those which have been so far cultivated in this country. They are very astringent, so that one can not ordinarily eat them out of hand. Among these varieties for drying purposes there are seedless persimmons as well as others.

A dried persimmon in looks and taste resembles a dried fig, with the exception that it is devoid of small seeds and is coated with a heavy layer of fine grape sugar.

Dried persimmons of different varieties differ both in taste and in appearance. This difference is not due to the variety alone, but to the greater or less care employed in their preparation. The coarser sorts, upon the preparation of which little care has been bestowed, taste very much like cooked pumpkin, but those of finer quality are as fine as dried figs, being even juicier and more palatable because of the absence of objectionable small seeds.

The cultivation of persimmons for drying purposes is a growing industry in China. New orchards are being set out, and since railways have been built new markets for the sale of them have been opened. Whereas in 1908 dried persimmons on the Peking market were extremely scarce, I found to my surprise a few years later huge piles of them on sale there. Upon inquiry I found that these persimmons had come from Honan, into which Province a new railway line had recently been finished.

In drying these persimmons the fruits, when ripe, but before they have begun to soften, are peeled or slashed, and these peeled fruits are then hung on strings to dry in the sun and wind. After drying for several weeks they are put into piles and covered with kaoliang matting and allowed to cure, during which process the grape-sugar coating is formed.

Since this persimmon industry is primarily one for semi-arid regions, the question of a stock which is drought resistant becomes a very important one. After having been a few weeks in China I noticed that the Chinese used a stock which was entirely different from the American persimmon and also was not merely a seedling stock. The bark was blackish in color and in old specimens deeply furrowed, whereas the bark of the ordinary oriental persimmon is of rather a smooth character and shows a tendency to peel off. Upon inquiry I found this stock was called *hae tsaō*, meaning black jujube. This name threw me entirely off the track, for although I saw straightway that it was not a jujube, yet I did not quite know what it was. Then I made it a point to find out where this so-called black jujube grew wild. At last, in a valley north of Peking, near the Nankau Pass, I was shown wild trees of this stock. I recognized it at once as a species of persimmon (*Diospyros lotus*) which

is also found in northern India, Persia, the Crimea, and the Caucasus. In the last-mentioned country it is known by the Turkish name of "ghoorma."

This ghoorma when found in its native haunts seems to be able to withstand drought and neglect to a remarkable degree, and it is for that reason, no doubt, that the Chinese have selected it as a stock. It has already proved to be better adapted to our semiarid Southwest than our native persimmon (*Diospyros virginiana*), which has been the only one heretofore used. These varieties for drying purposes budded upon the ghoorma as a stock will probably be very well adapted to large areas of land in the Southwest. Americans heretofore have never realized what an important food product the oriental persimmon is in its native country. Thousands of acres are devoted to its culture, hundreds of varieties exist there, and the trade in dried as well as fresh persimmons compares in importance with our trade in peaches.

BAMBOOS.

Of all the plants cultivated in China the bamboo is certainly one of the most indispensable. It exists in many species and varieties, ranging from tufts of a grasslike appearance only a foot or so high to jungles of giant canes often over 80 feet tall. Some are found on low, moist places, while others occur on steep, rocky slopes. Bamboos in China are grown in two ways, as clumps near the houses from which canes can be cut at a moment's notice and used for everyday household purposes, such as bean poles, switches for decorative purposes, or for repairing baskets or furniture, etc., and in large groves, often some distance from the villages, where they are grown for timber purposes only. In such groves the canes are cut only at certain times of the year, primarily in the winter months. In some sections of the country, in fact, the bamboo is so indispensable that if taken away the whole fabric of domestic affairs would crumble, and the people would be put to the most serious inconveniences. Bamboo timber in oriental countries in many ways takes the place that metals do with us, especially in the manufacture of household articles. No one can see the uses to which bamboo is put by a Chinese gardener

in his little garden patch without realizing what a convenient source of stakes for pea vines, stakes to hold labels, bean poles, temporary fences, guards against chickens, shade supports, fruit-tree props, small garden ladders, stiff brooms for farmyards and barns, temporary lath houses, etc., it means to him.

A fact relatively little known to the American public is that in China and Japan bamboo sprouts constitute a favorite vegetable. There are several species and varieties the shoots of which are edible, and they are not by any means of equal excellence. A good kind of bamboo sprout is a vegetable in a class by itself. Its crispness and freshness of flavor are such as to appeal to nearly everyone the first time it is eaten. It is not uncommon to find foreigners in the Orient who have become quite as fond of bamboo sprouts as the home people are of asparagus.

The varieties which are cultivated for their shoots are generally grown in gardens close to the houses and are heavily manured so as to insure a maximum of sprouts and tenderness of texture. Existing groves of one species in the Southern States and California thrive wonderfully well and from some of them sprouts have been cut which compare favorably with those produced in the Orient. It is believed that in this country the bamboo probably can be cultivated with as great success for table use as it is in the Orient, for not only do the Chinese colonies in our large cities form a ready market for these delicious sprouts and Chinese restaurants consume large quantities in the soups and other dishes served to their customers, but also many Americans have acquired in the Orient a fondness for this vegetable and would be ready to purchase the shoots if they were available.

For impressiveness there is no group of plants which surpasses the bamboo. To wander through an extensive grove in China or Japan makes one imagine himself in another world. One naturally marvels how a grass could grow into such giant forms as one sees around him. It makes upon the human brain possibly the same kind of impression that the ordinary grass might upon a tiny insect walking through it. After having seen the beautiful and useful clumps of bamboo in the Orient one's mind reverts to our own South-

ern States, and the conviction gradually grows on one that in the years to come many of our southern homes will be embellished by these remarkable bamboo groves. Already a few of these are to be found—enough to show that this is not a fanciful suggestion.

THE YANG MAE TREE.

In the vicinity of Hangchow, Chekiang Province, there are extensive groves of a peculiar evergreen tree locally called yang mae, but foreigners in that section of China apply the name strawberry tree to it on account of a slight resemblance which its fruit bears to the strawberry. This is an entirely new type of fruit, locally much appreciated, and one which evidently has been in cultivation for a very long period. The tree grows wild in the mountains and bears there small sour fruits. The natives, however, have developed several varieties which they perpetuate by inarching. One of the largest of these has fruits over an inch in diameter, possesses a fine, vinous subacid flavor, and in appearance is so attractive as to make it a very desirable table fruit. These fruits, which ripen in July, are wine-red in color and resemble slightly in outline sycamore balls. They are eaten fresh or as preserves. The trees grow slowly but are long-lived, and from the scanty evidence at hand it seems likely they will thrive along the Gulf Coast and along the milder portions of the Pacific Coast.

THE CHINESE LARGE-FRUITED HAWTHORN.

In certain sections of the South, such as northern Texas, the apple appears to be out of its range. In China similar regions exist—places where the winds in summer are scorchingly dry and the rainfall often is quite deficient, such as the region around Taianfu, in the Shantung Province. It is here that one finds large and thrifty orchards of a haw (*Crataegus pinnatifida*) which bears fruits the size of a crab apple. These fruits are of a very attractive bright-red color, refreshingly sour in taste, and can be kept for very long periods. They are eaten raw, coated with molten sugar, or better yet when made into delicious preserves or a stiff jelly

of fine quality. A few of the smaller fruited sour varieties can be boiled into sauce and supply a very agreeable substitute for the American cranberry. American missionaries in the Shantung Province have learned to utilize the haw in this way. The trees are of low, dense growth, bear heavily, and the finer varieties are all grafted upon seedling stocks. The demand in China for the best quality of these haw fruits is so great that it can not be supplied and the orchards are being extended. The fact that the Chinese have developed from a small-fruited wild hawthorn large-fruited forms of excellent quality naturally reminds one of the many excellent wild species of haws which occur on the North American continent, and one is impressed with the fact that an excellent opportunity to improve a promising native fruit has been neglected.

CHINESE EARLY CHERRY.

In the early spring of 1907, while near Tangsi, Chekiang Province, the Rev. A. Kennedy, a missionary stationed there, told me of a cherry which was grown in the vicinity and which, though quite small, not up to the American standard in size, was quite early. I visited with Mr. Kennedy an orchard where these cherries were grown, and, although they were leafless at the time, I recognized that they represented a different kind of cherry from the sorts we have. Scions were obtained and sent to the Plant Introduction Garden in California. Several fruit growers were provided with young budded plants, and last October, while visiting the Sacramento Valley, I found such an interest had been created by the remarkable earliness of this cherry that the growers were thinking seriously of setting out orchards of this variety only. In my opinion, this cherry has another important use, viz, as a factor in the production by breeding of earlier, large-fruited varieties.

THE ORIGINAL WILD PEACH.

During all these years of travel one thing always remained uppermost in my mind, viz, to find whether the peach really occurred wild in China, which country is supposed to be its original home.

In the summer of 1914, while going on foot through a loess ravine in the southern part of the Shansi Province, a few days' march east of Ping yang fu, I found a small, green peach the size of a marble lying on the side of the road. On biting into it I found that the stone was perfectly hard and well formed, and then on looking up I noticed several bushes clinging to the edge of a steep loess wall and having fruits on them of the kind I had found. Here at last was the original wild peach, from which probably most, if not all, of the cultivated strains have been developed. They were growing in such inaccessible, out-of-the-way places that there remained in my mind no doubt of their being genuinely wild. The Chinese, moreover, call them *yeh tao*, which means wild peach. In the Tsing-ling range from Sianfu through to western Kansu I found this wild peach at intervals, sometimes as solitary specimens, at other times in thickets.

STOCKS USED BY THE CHINESE.

The problem of finding congenial stocks for our cultivated fruit trees for different parts of this country is still in an experimental state, for certain stocks which have proved to be very successful in western Europe when tried in America have proved failures in many instances. It is in a country like China, with her great extremes of climate, resembling in this respect the United States, that we may expect to find a partial solution of this stock problem.

One of the first things which attracted my attention was that in the nursery gardens near Tientsin I found that the Chinese gardeners had grafted flowering plums upon a stock which resembled an almond, also chrysanthemums on the wormwood (*Artemisia* sp.), tea olives (*Olea fragrans*) on privet, and junipers upon the arbor vitæ (*Thuja orientalis*). These facts showed me at once that the Chinese in North China, at least, had tried to find congenial stocks which had root systems that were better suited to dry and alkaline soils than were the root systems of the plants themselves.

One of the plants which most impressed me was the almondlike stock. On asking the Chinese gardeners what they called it they gave me the name of *shan tao shu*, which means literally mountain peach tree. This name suggested

the possibility of this stock being the original wild peach. Upon inquiry where this could be seen I was informed that it grew wild in the mountains, but that there were many specimens to be found in the gardens of Tientsin and Peking. Upon being shown a specimen I found it to be the *Amygdalus davidiana*, originally discovered by Father David. This turned out to be a new stock never before employed by any of the Caucasian races, although seemingly in China it has been used for centuries as a stock for various stone fruits. It has even been introduced into various European and American botanical collections. After some difficulties seeds were procured of this *davidiana* peach, by which name it has come to be known in this country, and these have been tested in various places in the United States, as Chico, Cal., Ames, Iowa, and San Antonio, Tex., and, strange to say, they have proved hardy on the northern edge of the peach belt of Iowa and drought and alkali resistant in central Texas, Arizona, and California. It seems as though it would play an important rôle in the development of the stone-fruit orchards of the country.

The common stock for the pear on sandy and alkaline lands in North China is a species of wild pear (*Pyrus betulaefolia*), which bears bunches of fruits the size of large peas and is propagated mostly from cuttings. Trees grown in this country under uncongenial conditions have proved to be well suited to dry and alkaline situations. Unfortunately, however, it recently has been shown to be susceptible to the destructive pear blight, a disease apparently unknown in China.

While these furnish examples of the stocks already used by the Chinese, numerous wild plants, especially among the stone fruits, show promise of being valuable as stocks, and experiments with these now are being carried on in the United States to determine their relative value.

ORNAMENTAL TREES AND SHRUBS.

So many ornamental trees and shrubs have been obtained from China, especially during recent years, that I mention here only a few of those which were introduced as a result of these explorations and are proving distinct additions to American horticulture.

The Chinese pistache tree (*Pistacia chinensis*) gives promise of being a fine shade tree for large areas in the South and Southwest. It grows to be a stately tree with a dense head of gracefully pinnated foliage, which when it comes out in spring is a wine-red color, in midsummer dark glistening green, while in fall it turns into the most gorgeous flaming reds and yellows, making the tree a very conspicuous object in the landscape. It resists drought wonderfully well and will be especially appreciated in the warmer semiarid parts of the United States.

An elm (*Ulmus pumila*), native to Manchuria and North China, which in its native haunts resists drought and alkali to a considerable degree, proves to be of remarkable vigor and of great promise as a shade tree and windbreak in North Dakota and other regions in the Upper Mississippi Valley, where trees have a hard struggle with the climate.

The Chinese white-barked pine (*Pinus bungeana*) is undoubtedly one of the most striking in appearance of all the pines, with its glistening white trunk and its rather airy tufts of needles. It is decidedly a tree for semiarid regions, where it shows its characteristic white bark much earlier than it does in damp climates. When seen on burial grounds in North China its impressiveness is unsurpassed, and it might become in the future a favorite tree with Americans for use in cemeteries and formal parks and private grounds. Until 1914 this remarkable tree was supposed to occur wild only in the Province of Hupeh, but I discovered it scattered and in groves in southern Shansi, central Shensi, and southwestern Kansu.

A striking variety of willow with a naturally well-rounded head occurs near Peking and in the Shantung Province. It withstands drought, alkali, and cold remarkably well, and a clump of them is already growing in California, where the trees have received a great deal of attention because of their trim and formal appearance, which makes them peculiarly attractive.

Of the many shrubs useful for gardens and dooryards one of the most interesting is the yellow-flowered rose (*Rosa xanthina*), which occurs in its semidouble form cultivated in gardens in Peking, while the single form occurs wild in

the mountains of Shansi and Shantung. The bush is remarkably hardy and drought resistant, and in spring it is covered with a multitude of medium-size pale-yellow flowers. As a factor in the creation of new types of yellow roses it will probably be of importance; in fact, Mr. G. W. Oliver, of this department, informs me that he has already produced a hybrid between it and the *Rosa rugosa*, of the type of the *rugosa* but with yellow flowers.

CHINESE VEGETABLES.

While there are a great number of different vegetables in China, the great majority of them do not appeal to the palate of the Caucasian. There are some, however, which are worthy of the attention of American gardeners. The best of them is the *pai ts'ai*, or Chinese cabbage, which is grown primarily in northern China. The cabbages from Shantung especially are noted for their fine quality and are exported extensively along the coast of China even as far as Canton. These *pai ts'ais* do not emit as strong an odor when cooked as does the ordinary cabbage. They are delicate in flavor and are considered to be more easily digested. They can be used in a number of ways, resembling in this respect ordinary cabbage. It might be classed as a vegetable somewhere between Swiss chard, Romaine lettuce, and the ordinary white cabbage. Its successful establishment in the United States appears to have been already accomplished, and on several of the large markets it is being sold under the name of celery cabbage.

GINGER.

Fresh ginger is an article of food in China which one can buy in practically all of the larger markets during the greater portion of the year. The rhizomes are sold by weight and are eaten shredded or sliced in soups and in various meat dishes, and they impart a delicious and appetizing flavor.

Ginger is of great antiquity in China and was known quite well several centuries before the commencement of our era.

Kung-fu-tse, or Confucius, as his name is Latinized, China's greatest philosopher, stated in one of his discourses to his students that every person ought to eat ginger at least once a day for his health's sake.

It is rather surprising that ginger is so little used in American cooking. Several of our dishes could be much improved by a judicious use of fresh shredded ginger, and in our Southern States the plants might be grown in kitchen gardens without much trouble.

There are several varieties of ginger in China; the most productive sorts have to be grown in wet soil, and they need a long, hot summer in which to grow to perfection. It is mainly around Canton, in South China, that such sorts are grown extensively, and from that region tens of thousands of dollars' worth of preserved ginger is exported every year to various parts of the globe. However, there are also varieties that can be grown in much cooler localities and relatively dry soil. On one of my trips in the Shantung Province I found a large field of such dry-land ginger near Ninyang at 36° latitude. In this latitude in the eastern United States we find such cities as Knoxville and Nashville, Tenn. In the truck sections along the Atlantic we may find conditions favorable to the cultivation of ginger commercially and make ourselves independent of foreign importations.

Ginger, culturally, must be treated in much the same way as sugar cane, especially as regards storage during the winter; the rhizomes are injured by light frosts and can not stand drying out. It is not unreasonable to expect within a few years a keen interest in this interesting new root crop.

THE KAUBA, A NEW CHINESE WATER VEGETABLE.

One of the most interesting phases of Chinese agriculture is the way swamp lands are being made to yield crops. The Chinese as a race do not object to laboring in mud and in water as the Caucasian peoples do; hence, rather than drain their marsh lands, they have selected crops for them that bring in good returns.

Among swamp-land crops, rice of course stands out primarily, and in addition to it there are various root crops such as the lotus (*Nelumbium speciosum*), the water nut (*Eleocharis tuberosa*), wet-land taro (*Colocasia antiquorum*), and arrow-leaf (*Sagittaria sinensis*). A crop which is grown as a vegetable in many parts of China is the kauba (*Zizania latifolia*), a water grass very closely related to our own wild rice. It is not the seeds, however, nor the leaves, but the swollen fleshy stalks that are used. These are eaten, shredded or sliced, boiled in soups, or, when scalded, as a special salad.

This kauba is planted in rows and cultivated regularly and must grow in at least a few inches of standing water. An immense trade in its succulent shoots is carried on every season. Foreigners often call it water bamboo, and some western residents in China have become so fond of it that they have it on their tables whenever procurable. Some preliminary experiments made in this country show that this new water vegetable may possibly become some day a source of income to such truck farmers as are willing to engage in its rather disagreeable culture.

CHESTNUT-BARK DISEASE.

One of the duties of an explorer is to keep a careful lookout for plant diseases, insect as well as fungous, and during the six years of travel in China several of interest were discovered, the most important one of which was the chestnut-bark disease. It was found, for instance, that the chestnut blight (*Endothia parasitica*) exists on the chestnut of North and central China (*Castanea mollissima*), while in Japan it was found in abundance on the native species (*Castanea crenata*). In both countries many of the trees attacked show themselves remarkably resistant and great hopes are entertained that by careful selection and hybridization work chestnut strains can be created which will prove to be either wholly immune to this destructive bark disease or at least so resistant as not to be damaged very severely. The hybrids which Dr. W. Van Fleet has already produced in this country indicate that this is a promising field for the plant breeder.

In conclusion, I may be permitted to state that one of the most gratifying sensations of an explorer is that of coming back to this country and finding that certain of his new introductions are growing successfully and are appreciated by his fellow citizens, and that, moreover, some quite new industries are in process of evolution, based upon material which one has himself sent in from some foreign land.